

Kinetics of thermodestruction of aliphatic cyclic hydrocarbons – perspective components of aviation fuels

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The increase in the range of flights of aircraft can be achieved by using energy-intensive components in the composition of aviation fuels. Aliphatic cyclic hydrocarbons possessing high density, volumetric heat of combustion and boiling point, which allow to consider them as promising components of aviation fuels.

Investigation of the kinetics of the thermal decomposition of the components was carried out using the manometric method for increasing the gas pressure under isochoric conditions at temperatures from 410 °C to 550 °C and pressures up to 50 atm [1]. Thermodestruction products were studied by IR spectroscopy on the SPECORD-M80 instrument.

According to the research was proposed and tested the kinetic schemes describing sequential decay of the components releasing gaseous products, and schemes containing reactions of initiating free radical chain. The rate constants of the chemical reactions of the thermal decomposition of hydrocarbons obtained during processing of the experimental results confirmed the proposed kinetic schemes. The obtained kinetic data calculated the activation energies and pre-exponential factors of Arrhenius equation, the dependences of rate constants of thermal decomposition on the temperature, and the thermal stability of the investigated components.

REFERENCES

- [1] V.V. Dubikhin, V.G. Matveev, G.M. Nasin. Thermal decomposition of 2,4,6-trinitrotoluene in melt and solutions // *Izvestiya Akademii Nauk.* - 1995. - № 2. - P. 266 - 271.